

# Iowa Science Teachers Journal

---

Volume 23 | Number 3

Article 1

---

1986

## Cover - Front Matter - Table of Contents

Follow this and additional works at: <https://scholarworks.uni.edu/istj>



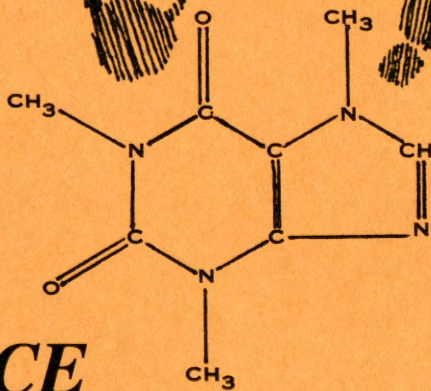
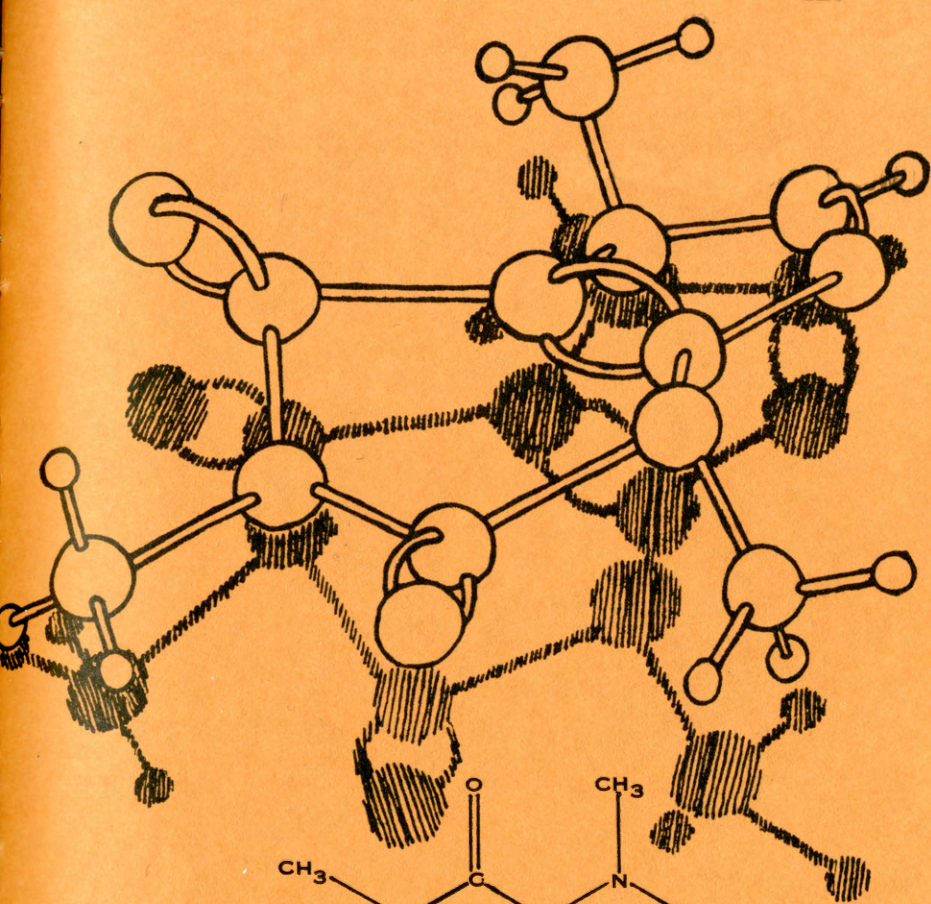
Part of the [Science and Mathematics Education Commons](#)

---

### Recommended Citation

(1986) "Cover - Front Matter - Table of Contents," *Iowa Science Teachers Journal*: Vol. 23 : No. 3 , Article 1.  
Available at: <https://scholarworks.uni.edu/istj/vol23/iss3/1>

This Front Matter is brought to you for free and open access by UNI ScholarWorks. It has been accepted for inclusion in Iowa Science Teachers Journal by an authorized editor of UNI ScholarWorks. For more information, please contact [scholarworks@uni.edu](mailto:scholarworks@uni.edu).



# **IOWA SCIENCE TEACHERS JOURNAL**

*Winter 1986-87*  
Vol. 23 (3)

ISSN No. 0021-0676



# THE IOWA SCIENCE TEACHERS JOURNAL

*The Iowa Science Teachers Journal* is co-sponsored by the Iowa Academy of Science and the University of Northern Iowa. The journal is dedicated to the improvement of science teaching and to the stimulation of interest in scientific studies. The journal is published tri-annually.

## SUBSCRIPTION

For subscriptions, circulation data, additional copies and change of address, write the Managing Editor, *ISTJ*, Iowa Academy of Science, P.O. Box 868, Cedar Falls, Iowa 50613. Single copies may be obtained for \$2.00.; a year's subscription is \$4.50. Any teacher of science in Iowa may obtain a subscription free of charge if a request is mailed to the Managing Editor; all such requests must be made on school stationery.

## PUBLICATION POLICY

Manuscripts for publications will be received from all individuals interested in science education at any academic level. Preferential treatment will be given to Academy members and to papers with topics of special scientific and educational interest to science educators in Iowa.

All non-solicited manuscripts submitted to the editor will be reviewed by two authorities in the area concerned. All manuscripts must be typewritten, double-spaced on one side of a sheet and submitted in triplicate. Refer to recent issues of *ISTJ* for examples of the uniform reference format which is required. Every attempt will be made to publish papers within a year after approval for publication. News items will be published promptly. Publication deadlines are March 31, September 30 and December 31.

For information concerning news items, announcements or articles, contact Carl W. Bollwinkel, Ph.D., Editor, *Iowa Science Teachers Journal*, Dept. of Teaching, Price Laboratory School, University of Northern Iowa, Cedar Falls, Iowa 50613.

Copyright 1987 by the Iowa Academy of Science. Permission to reprint in non-profit journals may be obtained by writing the Editor of the *Iowa Science Teachers Journal*. Permission will be granted with the condition that reprinted articles are accompanied by author and *ISTJ* credit. Requests for commercial use should also be addressed to the editor.

## Responsibility

Experiments, laboratory exercises, lecture demonstrations and other descriptions of the use of chemicals, apparatus and instruments are presented in this journal as illustrative and directed at qualified teachers. Although every effort is made to ensure and encourage safe practices and safe use of chemicals, *ISTJ* cannot assume responsibility for uses made of its published materials. All those teachers planning to use materials from our pages should make choices and develop procedures for laboratory and classroom safety in accordance with local needs and situations.

# IOWA SCIENCE TEACHERS JOURNAL

Volume 23

Number 3

Winter 1986-87

## Contents

- 2 EXERCISES ON THE NATURE OF SCIENCE:  
THE NECESSITY OF OBSERVATION

*Roland P. Stout*

- 6 THE KEYSTONE PROJECT: A COOPERATIVE  
IN-SERVICE PROGRAM

*Sandra K. Abell, Edward L. Pizzini and Joe R. Moore*



- 13 ENVIRONMENTAL EDUCATION TEACHER  
AND STUDENT NEEDS

*Gail George*



- 16 PLANT PART PUZZLES

*Kathleen Marvin and Carl W. Bollwinkel*



- 31 INDEX TO VOLUME 23

---


### Departments

19 SCIENCE NOTES

26 SCIENCE CALENDAR

30 EDITOR'S CORNER

---

 This symbol identifies articles of particular interest to elementary teachers of science.

## The Cover

The cover is an ink drawing, "Caffeine Molecule." The art work was done by

**L. Andrew McGrew**

McGrew is a senior art student at Price Laboratory School  
University of Northern Iowa